

Advanced Electric Field Deployment Systems Project

Completed Technology Project (2016 - 2017)



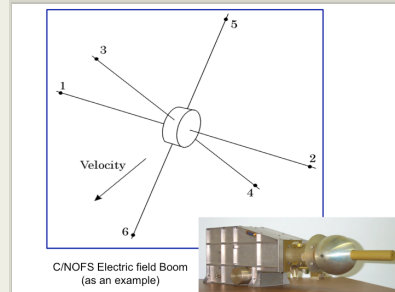
Project Introduction

The Advanced Electric Field Deployment Systems provide prototype design, analysis, fabrication, and testing of advance electric field deployers (or booms) that are currently under development at Goddard Space Flight Center for numerous electric field experiments envisioned for future Heliophysics space missions.

Since electric field boom systems impact spacecraft design and planning, a nominal boom system is essential to establish basic technical and scientific design and performance. The project leverages Goddard Space Flight Center expertise in a wide number of areas within the Applied Engineering and Technology Directorate (AETD) as well as the Sciences and Exploration Directorate. The prototype advanced electric field boom design include both rigid booms, appropriate for non-spinning satellites as well as booms to be deployed along the spin axis of spinning satellites and wire booms for spinning spacecraft including sounding rockets. The booms nominally deploy spherical electric field sensors, but other types of sensors may deployed with these units. The project includes the design, analysis, fabrication, and test of prototype units advanced to the point where they may serve as a solid foundation for the fabrication of electric field booms for spaceflight use.

Anticipated Benefits

Enable accurate vector measurements of DC and AC electric fields in space, in a vairety of plasma environments.



The boom geometry concept shows orthogonal, three-axis pairs of double probes. The photograph in the lower right hand corner shows one of the electric field booms flown on the C/NOFS satellite.

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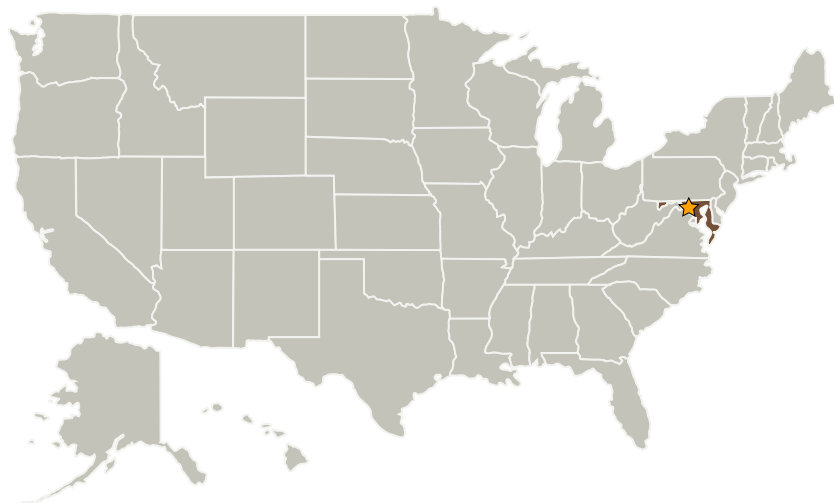
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Co-Funding Partners	Type	Location
ADNET Systems Inc.	Industry Small Disadvantaged Business (SDB)	

Primary U.S. Work Locations
Maryland

Project Transitions

▶ **October 2016:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:Nikolaos Paschalidis
Timothy C Gehringer**Principal Investigator:**

Robert F Pfaff

Co-Investigator:

Douglas E Rowland

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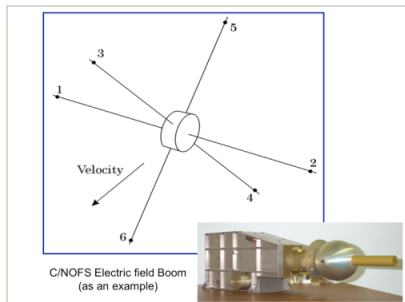
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September 2017: Closed out

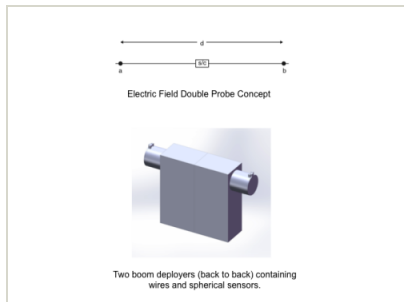
Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. <http://techport.nasa.gov/help>

Images



Advanced Electric Field Deployment Systems

The boom geometry concept shows orthogonal, three-axis pairs of double probes. The photograph in the lower right hand corner shows one of the electric field booms flown on the C/NOFS satellite. (<https://techport.nasa.gov/image/27867>)

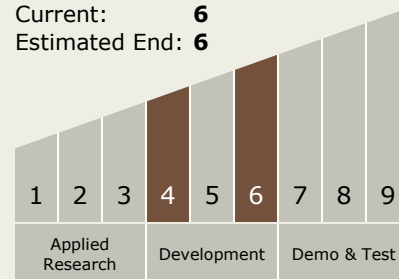


Electric Field Boom Geometry (3-axis) and example of deployer

The upper portion of the image shows the double probe concept where two opposing booms extend electric field sensors about the spacecraft. The lower portion shows two back-to-back deployers in which wires and spheres are contained. (<https://techport.nasa.gov/image/4217>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX08 Sensors and Instruments

Target Destinations

Earth, Mars, Outside the Solar System

Center Independent Research & Development: GSFC IRAD

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Project Website:

<http://sciences.gsfc.nasa.gov/sed/>